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FISH FARMING OFFERS PROTEIN POTENTIAL

by Michelle Hibler

PHILIPPINES, IDRC -- Fish farming has enormous potential to increase food protein production in the tropics, by exploiting millions of hectares of natural and artificial waterways throughout the developing world that are at present under-utilized. But before aquaculture can fulfill its promise, there must be improvements in fish stocks similar to those made in plant and animal breeding for land-based agriculture in recent decades.

At Tigbauan, in the Philippines, headquarters of the Aquaculture Department of the Southeast Asian Fisheries Development Centre (SEAFDEC), researchers have been working for seven years to improve the milkfish, one of the the most popular cultured fish in the region, to make the most of its food potential. Although it has been farmed for centuries very little is known about this fish.

Milkfish (their scientific name is Chanos chanos) are widely distributed on tropical waters from Africa to the Americas, but are extensively farmed only in Southeast Asia. Known as bangos, bangus, or sabalo in the Philippines, milkfish are the preferred fish of Filipinos and the country's main aquaculture species. The reasons, as explained in a 1932 study published in the Philippines Journal of Science are: "...the remarkable adaptability of the bangos...Rapid of growth, vegetarian, and absolutely non-cannibalistic in habit, prolific by nature, and palatable in flesh, the bangos is without question one of the best. The availability of the fry or tiny young in numerous quantities during seasons of the year is a very important factor in its favour."

INTERNATIONAL DEVELOPMENT RESEARCH CENTRE ● Communications Division, Box 8500, Ottawa, Canada, K1G 3H9
Telephone (613) 996-2321 ● Cable: RECENTRE ● Telex: 053-3753

That may well have been true in 1932, but in the 50 years since those "numerous quantities" of fry have not been sufficient to meet demand. An estimated 1.3 billion fry are needed annually to stock 160,000 hectares of ponds devoted to milkfish culture in the Philippines alone. Fry collection using age-old techniques is highly destructive of other aquatic life and yields only 500 million.

As the early researchers noted, although the milkfish is prolific in the wild: "It is a well established fact that bangos do not reach sexual maturity in the fishponds." And that became a major stumbling block to the expansion of milkfish cultivation throughout Asia.

Thus, when SEAFDEC, with the aid of a grant from Canada's International Development Research Centre (IDRC) launched a programme to improve milkfish production, mass-scale seed production was a priority. But first a number of basic questions had to be answered: How and where do you catch a milkfish breeder alive? How do you keep it alive? How do you differentiate between males and females, since there are no obvious external characteristics?

SEAFDEC's seed production team started out by capturing wild spawners, but mortality was high. Milkfish are so excitable that capture and handling causes stress that often results in death. A technique for handling and transporting the wild fish had to be developed before a good survival rate was achieved.

The first experiments to induce milkfish to spawn in 1976 met with partial success, but the eggs could not be fertilized. In April 1977, however, newspaper headlines throughout the Philippines proclaimed "Bangus is born", "Breakthrough in milkfish culture", and even "Bangus without sex". Spawning had been induced by injecting hormones, and the eggs were fertilized with sperm from induced males, then incubated and hatched. SEAFDEC's researchers were somewhat embarrassed by the fanfare -- including a presidential citation -- that accompanied this "world first" artificial breeding of milkfish. Dr Jess Juario, project leader, cautions that the process must be refined and standardized before milkfish farmers can reap the benefits.

Standardization requires a more abundant and reliable supply of spawners than can be caught in the open sea. So pond-grown juveniles were stocked at the Department's marine station at Igang, on Guimaras Island, where they were to be raised as broodstock. Captured mature milkfish that had already spawned were also kept in cages in the sheltered cove to see if they could be induced to spawn again.

Every week, the immature fish were injected with hormones to stimulate gonadal maturation, but to no avail. Fish in other cages were part of a control group, to see if they would mature naturally. They didn't. Every month the cage netting of both was changed to prevent fouling, and the fish were removed for examination. The researchers finally began to suspect that this handling was preventing the highly sensitive fish from maturing. They decided to leave some of the fish alone. Six months later, in August 1980, all the fish in the "neglected" cage had matured, and the researchers recovered 1400 eggs outside the cage. It seems it may be possible to domesticate milkfish after all.

The advantages of spontaneous breeding are obvious: it requires only floating cages that could be established almost anywhere, reducing the need for recirculating and aerated tanks, and costly transport of fry. Recovery of the floating eggs is still a problem, however. Various cages have been designed at Tigbauan, but none so far is satisfactory to both the fish and the researchers.

Breeding is only one thrust of the research programme. Ecological surveys were carried out to locate milkfish spawning grounds and enable the researchers to identify the ecological conditions best suited to the fry's survival and growth, and for natural spawning of adults. Techniques of milkfish culture have changed little since the explorer Magellan noted the milky-white fish kept in brackish ponds wihen he visited Cebu some 450 years ago. The researchers are developing more efficient means of production: pond engineering, feed production, and predator control are all under study. For example, feed trials suggest that lablab, a mixture of algae, is a natural food for milkfish of all ages. This is important because to date no satisfactory formulated feed has

been found. Pond designs incorporating special ponds for growing lablab have now been developed. Polyculture experiments have shown that milkfish can be raised together with lucrative prawns.

One of the main problems remaining to be solved is fry mortality. For every 1000 fry stocked in ponds, only 378 fish are harvested. The first three or four weeks are crucial, and the low survival rate is the same for fry collected from the wild or bred from spawners. But the researchers, boosted by their successes to date, are confident they will succeed.

Dr Juario points out that some 1.5 million hectares of tidal flats, swamps, lagoons and other bodies of water lie idle in the Philippines - waters that could produce both food and employment. The project may be instrumental in fostering the development of these areas, he believes.

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Michelle Hibler is editor-in-chief of the quarterly magazine, The IDRC Reports, and a writer on science and development.